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ABSTRACT

Three major themes of ecology, ethics, and economics characterize the current conservation/environmental movement and present a challenge for the environmental educator in teaching about environmental quality. This bulletin provides assistance for the practitioner by identifying current instructional materials that address concerns in this area. The materials have been selected from those catalogued in the ERIC database since 1983 and are considered to be representative of existing available materials. Explanations of the selected instructional programs are provided and organized in 13 topic areas: population; world hunger and economics; air quality; water quality; water resources; wetlands; marine and aquatic education; hazardous wastes; energy education; wildlife; land use; urban environments; and decision-making, individual and institutional. A listing is included of teaching activity booklets which were published at the ERIC Clearinghouse for Science, Mathematics, and Environmental Education over the past 13 years. Two pages of references complete the document. (ML)

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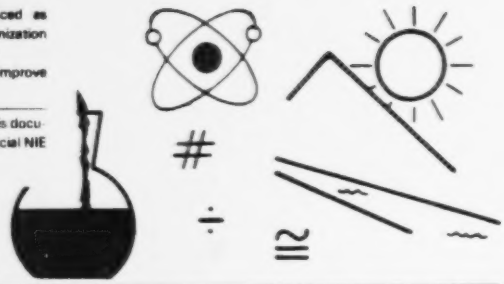

Information Bulletin No. 2, 1985

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# Instructional Materials for Improving the Quality of the Environment

America's third conservation movement, begun during the 1960s and still in progress, has had as its focal point the quality of the environment, with primary concern for the human environment. Strong emphasis continues to be accorded the central importance of the quality of the natural environment, not necessarily as an end in itself but in terms of its critical relationship to the human environment. For reasons both intellectually and pragmatically irrefutable, the natural environment and the human environment are best viewed as inseparable, inextricably intertwined, effectively a "total environment."

In her landmark publication, *Silent Spring,* Rachel Carson (1962) strikingly demonstrated the intricacy of interactions between human and natural environments, their essential oneness. Her argument was developed through succinct examples of the impacts of human-made pesticides on the natural environment, with additional consideration of the necessarily resultant impacts on the quality of life for the human race, framed in terms of environmental quality. Stewart Udall (1963) described the evolution of environmental quality, in terms of resource use and abuse, over the course of United States history, culminating in his identification of urgent need for the development and institutionalization of a land ethic to govern humankind's relationship to the environment. In many ways, Udall echoed Aldo Leopold's 1948 plea for an ethical relationship between humans and land, or (in a more general sense) between humankind and environment. Thus, the themes of "ecology" (the totality of relations between organisms and their environment) and "ethics" (dealing with moral duty and obligation) have permeated considerations of environmental quality during the present conservation/environmental movement.

A third theme, economics (the description and analysis of the production, distribution and consumption of goods and services) is necessarily an additional major consideration, both from the standpoint of historical perspective and with respect to the realities of modern social systems. Economics was a major element of both the first and second United States conservation movements, and continues to be omnipresent in determining the course of human interactions with resources and environment. Interrelationships and interactions between and among these three elements occupies much of the attention of environmentalists, conservationists, resource managers, environmental managers, and environmental educators, often implicitly, on occasion quite explicitly (e.g., Jeske, 1981).

## Striking the Balance

In any consideration of ways to teach about environmental quality, the teacher or curriculum designer is confronted with the difficulty of locating and incorporating materials which treat all three elements in equitable fashion. It is unrealistic to expect to locate or develop specific activities or lessons which individually provide the desired and necessary balances within themselves, so effective coordination and development of instructional sequences normally necessitates the use of materials which singly treat portions of the elements of environmental quality; arrangement and balance within the sequences is of critical importance. Difficulties are compounded because the three elements—ecology, ethics, economics—have historically been within the domains of three organizationally separate curricular areas—the natural sciences, the humanities, and the social sciences, respectively. Thus, three different types of qualifications associated with three different types of educational background, or scholarship, are required of teachers. This presents a near-classic example of difficulties encountered when faced with varying approaches, perspectives, and expertise.

An attendant difficulty is the development of courses, programs, or curricular sequences which provide for equitable treatment of each element, concurrently retaining sufficient focus to justify their inclusion in instructional programs. A third problem has two aspects—what do we call such programs? and how do they logically fit into real-world curricula?

The latter two concerns are not treated here, though they are at the crux of the practitioner's problem. The purpose of this *Information Bulletin* is to identify instructional materials which can be useful as components of instructional programs dealing with environmental quality; how they can be used as parts of such a program remains to be dealt with by the practitioner, on the basis of his/her specific objectives and constraints. The materials themselves have been selected from those catalogued in the ERIC data base, and are presented here as suggestions, or alternatives, which practitioners may wish to consider as components of instructional packages having as a major goal the development of an environmental quality perspective. They are intended to be representative of existing materials, and do not constitute an exhaustive listing or necessarily a superior set in comparison to others extant. Most have been abstracted in ERIC's *Resources in Education* since late 1983. In most cases, ERIC abstracts were used in the development of brief descriptions here. All of the publications themselves were developed and/or refined for instructional use in educational settings where considerations of environmental quality were of clear concern, though not necessarily the stated concern, and not generally the sole concern.

## Focus: Population, World Hunger

Generally, human population growth has been and is accepted as the primary triggering mechanism behind worldwide environmental quality problems; the greater the population, the greater the human demands on the resource base, the more extensive the

impacts of human activity on environment (Barney, 1980). The "simple question" is, how many humans can the earth's resource base, and environment, support? It becomes somewhat more complex when qualified: ". . . at what levels of quality of life?" A complementary question, which confounds the analysis even more, concerns the equity issue—what about the inequalities in existing demands on the environment between developed and developing nations, well-documented, ominous widening of the quality-of-life gaps between them? Peters (1985) stresses that developed nations must be concerned with rampant human population growth in the developing world and must realize that the chaos, conflicts, and political instability that will result from an unchecked population growth will have long-term disasterous consequences for all. He presents sample units for teaching about the natural and social environments within the context of contemporary problems. Included activities deal with population problems, pollution, international economics, international trade, technological development, and the lifestyles of different peoples. Also presented is an annotated bibliography of print and nonprint materials and human resources.

Lessons focusing on population problems, population in India, world population growth, problems of independent India, effects of population size on per capita income, standard of living and economic development, the effects of population change on ecological balance, quality of life and socialist modernization, population and cities, children as liabilities and assets, and sociocultural values affecting population change are included in a social studies-oriented booklet produced by UNESCO's Regional Office for Education in Asia and the Pacific (1984d). Companion volumes (1984a, 1984b, and 1984c) present population education lessons for, respectively, health and home economics, mathematics, and science.

Student and teacher materials are provided for a secondary school unit on world hunger as related to population growth, as developed for the Population Reference Bureau (Murphy, 1984). A reading for students deals with the relationship between world food supply and population—how human populations became so large, the extent and location of world hunger, recent agricultural advances, the role of poverty and population growth, biological constraints on food production, the question of food aid versus development aid, and strategies for addressing world hunger problems. Charts and graphs illustrate population trends, population growth, vital statistics, world calorie consumption, and agricultural and food production statistics. The teacher's guide introduces the main themes covered in the student reading and provides a variety of accompanying classroom activities.

The problem of world hunger is explored in student and teacher materials developed by the Bread for the World Educational Fund (1980a, 1980b). Twelve units of study at the high school level deal with justice and the right to food, the dimensions and scope of the hunger problem, why people are hungry, overcoming hunger, U.S. policy options for overcoming hunger, ethical issues surrounding the hunger problem, churches' efforts to deal with the problem, and case studies of Christian efforts to help alleviate world hunger.

**Focus: Economics**

High school students determine and meet the economic needs of imaginary island countries in a student-teacher created simulation game (Waldorp, 1981). The class is divided into six countries which determine their own economic systems. Each group is provided with a summary of the current world economic situation and a confidential description of their own country's economic position in six commodities. In six rounds of play, the groups trade commodities while dealing with unforeseen political and environmental "events" which affect their economic situations. Upon completion of the game, the "winning country" is determined as the one that has most satisfied its economic needs and/or accumulated surpluses.

**Focus: Air Quality**

Because it is transported by air, acid rain is typically classifed as an air pollutant; during the past several years, much attention has been devoted to it, and several sets of curriculum materials have been developed.

National Wildlife Federation (1983) has released a publication discussing the nature and consequences of acid precipitation (acid rain). Topic areas include the chemical nature of acid rain, sources of acid rain, geographic areas where acid rain is a problem, effects of acid rain on lakes, effects of acid rain on vegetation, possible effects of acid rain on humans, economic losses related to acid rain, and a possible solution (suggesting that the pollutants causing acidity be controlled). Comments from the National Academy of Sciences on the problem, proposed federal legislation related to the growing environmental threat, and information on what individuals can do to help control acid rain are included.

National Wildlife Federation has also published an Acid Rain Teacher's Kit (Wood and Bryant, 1983) which explains what causes acid rain, what problems acid rain has created, and what teachers and students can do to help combat it. Instructions for activities include suggested grade levels, objectives, materials needed, and directions for the teacher. Many of the activities are science experiments or investigations, involving learning about acidity, the water cycle, sources of acid rain pollution, air-borne particles, acid rain's effects on aquatic life and plant seedlings, and the buffering capacities of various types of soil. Other activities involve talking with people in the community, learning about the Clean Air Act, and writing letters to elected representatives. It is suggested that the activities could be incorporated into many subject areas and that a motivating approach would be to organize the class into small study teams. A crossword puzzle, a glossary, and a bibliography of 17 journal articles, one filmstrip with cassette, one film, and one set of curriculum materials are included in the kit.

A teacher's resource guide designed to help science teachers incorporate the topic of acidic precipitation into their curricula (Barrow, 1983) includes introductory material designed to give an overview of its causes and effects, its relation to energy production, and some possible ways of reducing or eliminating it. Six laboratory activities, independent of one another, and appropriate for students utilizing concrete operational thinking patterns, are included; some are modifications of activities published by the Acid Precipitation Awareness Project. Referenced are additional resources for teachers and students who wish to pursue the topic further.

**Focus: Water Quality**

Research and project-oriented activities at the secondary school level for studying Illinois' streams, water pollution, and methods for controlling pollution are presented in a teacher-learner guide from the Illinois Environmental Protection Agency (Zenke, 1980). Social, economic, and pollution issues are examined as part of the planning for pollution prevention. Background information traces the development of federal water pollution control legislation in the United States. Urban storm runoff, construction site erosion, coal mining, and soil erosion are described as major sources of water pollution. An activity sheet, designed for use with a road map, utilizes mathematics, geography, and the metric system in making students aware of streams in the area and their importance.

A student reading booklet, a reference booklet listing a variety of popu-

lar chemical, biological, and physical tests which can be performed on a local waterway and providing information about the environmental effects and toxic limits of various potential pollutants, a selection of simple in-class and field experiments, and a teacher's guide to field testing a local water source comprise materials for teaching a unit on water pollution (Jacobson, 1983). These materials, written at an approximate seventh-grade reading level, are designed for, but not limited to, students in grades 7 through 10.

The objective of an environmental studies unit (Alberta Environment, 1984a, 1984b) for high school students in the Province of Alberta was to establish a water quality monitoring project, while simultaneously providing a unit designed to meet the objectives of existing biology curricula. Through the project, students assist in the collection, identification, and tabulation of the invertebrate fauna of selected Alberta rivers. In addition to developing an awareness and critical understanding of the environment and related current social problems such as pollution, the project also assists Alberta Environment in accumulating scientifically reliable information to determine areas of concern and whether remedial action is necessary.

Background information and activities related to groundwater protection are provided in a sourcebook developed by the East Michigan Environmental Action Council (1984). Addressed are the characteristics of groundwater, the water cycle, stormwater runoff, uses of groundwater, household hazardous materials from both safety and groundwater standpoints, and groundwater threats to the community as a whole. The materials are designed for use in middle school science and social studies classes.

**Focus: Water Resources**

Designed to serve as a framework from which high school debate coaches, students, and judges can evaluate the issues, a booklet focusing on the debate resolutions selected by the National Federation of State High School Associations (Wagner and Fraleigh, 1985) deals with a review of useful information on researching the topic of water resources, an overview of the general issues of water policy, problems of water quality, and issues of water allocation.

The importance of water as a resource, the need for conservation, water storage through dams and reservoirs, irrigation, the lack of water in the old West, the uses of water for cities and towns, crops, energy, recreation, wildlife and fish, and flood control are treated in an elementary student guide designed by the Bureau of Reclamation, U.S. Department of the Interior (1981). Classroom activities are provided for each area of concern.

**Focus: Wetlands**

The wetland resources of Illinois provide the theme for an instructional guide (Stone, 1984) for middle school students. Its 19 activities and exercises include making a model of largemouth bass, building a wetland ecosystem, investigating problems that threaten wetlands, working as a wetland manager, visiting a wetland area, and examining a fictional account taken from the journal of a young boy living and writing in modern-day Illinois.

Under sponsorship of the U.S. Environmental Protection Agency, Western Washington University has developed separate units for the elementary school, the middle school, and the high school (Newton and Slesnick, 1981a, 1981b, 1981c) dealing with wetland ecology. Each contains activities and activity packets containing data sheets, activity sheets, flash cards, game cards, and other materials needed to complete the activities. Topics considered at the various levels include wetlands environments, food chains, effectiveness of environmental action campaigns, effects of physical and chemical changes on wetlands, flood control, endangered species in wetlands, and Section 404 of the Clean Water Act of 1977.

The use of urban wetlands for stormwater control and wildlife enhancement is considered in a guide developed by Adams and Dove (1984). Examined are the nature of urban stormwater, why it should be controlled, control methods including detention and retention basins, manmade wetlands for stormwater control and wildlife enhancement, and the relation of people to urban wetlands.

Grades 4 through 7 are the intended audience for a teaching packet designed by the Fish and Wildlife Service, U.S. Department of the Interior (1984g) focused on wetlands conservation and use. Materials include an overview, teaching guides, and student data sheets. Topics presented are a field trip to a local wetland, to survey its values, examination of different sides of issues surrounding wetland uses, and wetland conservation and use.

Another Fish and Wildlife Service publication (1984c) provides materials for the same grade levels on how the freshwater marsh is an important natural resource for plant, animal, and human populations, and how the destruction of marshes causes a wide network of ecological problems, from decline in water quality to loss of plant and animal species.

**Focus: Marine and Aquatic Education**

Another item in the series published by the Fish and Wildlife Service (1984a) describes the nature of beaches, dunes, and barrier islands, tracing their development, settlement, and management and emphasizing the mobile, dynamic nature of such habitats. Among activities presented are a transect study in which students are introduced to a beach's habitats, zones, movement, and problems, an investigation of the adaptations necessary for survival on a beach, and an exploration of human uses of beach, dune, and barrier island habitats.

A compilation of ideas for teaching elementary school students about marine and fresh water (Solomon, et al., 1983) includes student worksheets, field trip ideas, illustrations, vocabulary lists, suggested materials, and step-by-step procedures. Activities span the breadth of curricular areas in the elementary school curriculum, with particular attention to science and mathematics.

Various topics related to the Great Lakes for elementary and middle school grades are featured in a curriculum guide produced by the Environmental Resources Center of University of Wisconsin-Extension. (Entine and Fisher, 1985). They are designed to fit into existing geography, science, language arts, drama, history, social studies, and economics curricula. In addition to providing information about the Great Lakes, the activities are intended to help students develop their observational, creative, inquiry, analytical, and problem-solving skills.

Twenty-six units intended to serve as points of departure for teachers and students who desire to increase their awareness of the marine environment are contained in a National Science Foundation-sponsored guide produced at the University of Maine (Butzow, et al., 1982). Each unit includes ideas and activities drawn from a variety of content areas so that teachers of many different subjects at the junior high and middle school levels can make use of them. General topics include marine art, boats, ships, and navigation, fish and fisheries, sea mammals, sea birds, tides and current, aquaculture, recreation, marine geology, marine navigation aids, marine biology, marine plants, and marine history.

Over the past several years, many "packages" of curriculum materials centered on marine education have been developed for local use. Frequently, they are adaptable to other locations, at least in the sense that they provide useful models. An example of such a set is the Project CAPE teaching module series, sponsored by

the Dare County, North Carolina, Board of Education (Carroll and Carroll, 1982; Platania and Haught, 1983; Kelly and Phelan, 1982; Gray and Forrest, 1982; Gray and Martin, 1982; Hampton and Weston, 1982). Among them, they span grade levels from kindergarten through 10, and provide activities of use in multiple curricular areas. Focal topics include field trips, early maritime cultures, water world creatures, community development, and marine organisms.

**Focus: Hazardous Waste**

If there is a current "hot topic" in the environmental area, it is in the area of waste disposal and/or reuse, with particular concern for the safe elimination of hazardous/toxic substances. Though this general concern can be defined to include all media of disposal—air, water, land—currently emphasis is placed on land disposal.

Toxic waste as one example of a current issue requiring social action provides the focus for a classroom/teacher guide developed by Educators for Social Responsibility (Goldman, et al., 1984). The skill of investigating as a means of introducing students to emperical methods, to the connection between science and social problems, and to an awareness of environmental issues is stressed. Student activities include identification of hazardous waste substances, finding out more about residential toxic waste, and exploring toxic waste treatment in the local community. Lab activities deal with toxic waste and ground water, testing soil and water, the effect of pH and salt on living organisms, and detection of heavy metals in water.

A bibliography of curricula, audiovisual aids, children's books, and publications about resource recovery presents resource recovery as a strategy to reduce air and water pollution, to conserve natural resources, and to conserve energy. The thrust of the document is to help promote the goal of reducing dependence on waste disposal by reducing the amount of waste generated and by recovery of materials and energy from waste.

The use of biomass conversion techniques with municipal solid wastes as a viable action for energy development has been produced by Tennessee State University at Nashville (Baxter, et al. 1981). Included are a discussion of biomass conversion, an historical review of energy use from wastes, designs and operations of energy recovery systems, and economic aspects of biomass recovery systems.

**Focus: Energy Education**

An energy education program at the primary level should help students to understand the nature and importance of energy, consider different energy sources, learn about energy conservation, prepare for energy-related careers, and become energy conscious in other career fields (Tierney, 1984). This guide, sponsored by the California Energy Extension Service, provides activities, charts, readings, and experiments designed to meet the objectives of such a program. Procedures and instructional strategies are provided for included activities, as applicable.

Eight energy education activities for secondary school science and social studies curricula are provided for use in the State of Minnesota, with potential for application elsewhere (Minnesota State Department of Education, 1982). They focus on using social studies skills to understand energy data and to clarify and understand Minnesota energy issues, giving reactions to 20 energy statements about Minnesota, collecting and evaluating information on some problems and potentials of Minnesota's alternative energy sources, comparing energy costs of low income and non-low income households, examining the state's energy future using a Delphi technique, writing a description of a possible energy future which explores the sequences of events leading to a future state, reading and reacting to information about a coal severance tax and its impact on Minnesota, and examining the comparative costs of conservation and the costs of energy from other sources.

Three guides (Backler, 1984a, 1984b, 1984c) developed for the State of Indiana's Energy Education Curriculum Project contain a total of 30 lessons across all grade levels, designed to help students become more aware of the energy choices they must take in the present and for the future and to understand that the costs of maintaining a specific standard of living and thriving national economy can be controlled with wise energy choices and decisions. Each lesson includes a statement of concept(s) fostered, time requirement, list of materials needed, rationale, instructional objectives, suggested teaching procedure, suggested evaluation strategy, additional activities, and (where applicable) student handouts, worksheets, and transparency masters.

Another aspect of Indiana's Energy Education Curriculum Project is treated in a set of three Energy and Transportation guides (Ballou and Lane, 1984; Parker and Yoho, 1984a, 1984b), designed to create an awareness of the present energy situation and its relation to various aspects of transportation systems; provide knowledge of energy resources, choices, and alternative actions; develop critical thinking skills about energy and individual roles in the energy management process; encourage problem-solving habits as students examine alternative solutions to energy and transportation issues; and influence participation as students practice consumer roles and decision-making in their homes, schools, and communities.

**Focus: Wildlife**

Four more items in the Fish and Wildlife Service's 1984 "habitat pac-issue pac" series address various considerations dealing with wildlife. An Issue Pac, *Wildlife Conflicts* (Fish and Wildlife Service, 1984h), focuses on the range and nature of conflicts that can occur between wildlife and people, discussing some of the reasons these problems arise and how some conflicts can be reduced or avoided with proper planning. *Hunting and Wildlife Management* (Fish and Wildlife Service, 1984d) discusses hunting as a tool for wildlife management, the management of wildlife populations and hunter participation in providing research data, and the economic aspects of hunting. *Migratory Birds* (Fish and Wildlife Service, 1984e) discusses how, why, where, and when birds migrate as well as problems birds encounter while migrating; the importance of research and management is also addressed. *Endangered Species* (Fish and Wildlife Service, 1984b) presents the history, causes, and present state of species endangerment and a review of legislation designed to protect threatened or endangered plants and animals. Each guide, designed for use with grades 4-7, includes a glossary and list of references. The lesson plans provide lists of learning outcomes, instructional strategies, a list of materials needed, and suggested quiz questions.

**Focus: Land Use**

Case studies and independent investigations to emphasize the transdisciplinary nature of land use questions provide the approach employed in a guide developed by the Biological Sciences Curriculum Study, *Investigating the Human Environment: Land Use* (Uno, et al., 1984), designed as a seven-week instructional module for high school and community college students. In addition, the program focuses on the development of independent thought, a healthy skepticism, and problem-solving skills that lead to good decisions.

An endeavor to alert elementary teachers and students to the need to protect and conserve one of Minnesota's basic resources, soil, *Protect Minnesota's Agricultural Land* (Noy, 1984 contains supplementary instruc-

tional activities designed for integration into science, social studies, language arts, mathematics, and art subject and skill areas. The activities are organized under seven topic areas: what is soil, relationship of soil to wind and water, relationship of soil to plants, soil productivity, planning for wise use of land, soil conservation and preservation, and land utilization (world food needs).

*A New Land Ethic for the 21st Century* (Keown, et al, 1984), describes the environmental education program at the University of Wyoming's laboratory school which promotes the generation, in students, of a love for the land. Among activities described are laboratory and field work, club activities, and extended excursions.

**Focus: Urban Environments**

Five lessons using a block of houses in an urban neighborhood to help students learn about the history of the neighborhood, the owners of the houses, and the style and architectural features of the homes (Eckbreth, 1983) provide a model for similar activities in a number of locations. Lesson topics include the following: preparing for a photo study field trip, participating in a photo study field trip, sharing observations and learning from such a trip, identifying architectural styles from photos, and learning to use city directories to locate home ownership information.

Seven units of study for secondary level social studies classes learning about New York City are presented in a guide prepared by the New York City Board of Education (1982). The curriculum was designed to encourage students' active participation in, rather than passive observation of, their urban environment. The activities presented require students to investigate their own community's physical environment, the people who live there, its social and cultural characteristics, and its economic and political structure. Within each unit, activities are described and their relation to the development of particular skills and the fulfillment of educational objectives is explained.

*City Planning Unit: Grade 6* (Dalton, 1980) describes a project designed to make government lessons and economics more appealing to sixth grade students by having them set up and run a model city. Topics include transportation, funding education, trying to prevent a factory closing through the formation of a corporation, electing new council persons and a new mayor, pollution, nuclear power, and redevelopment.

*The City: A Multidisciplinary Unit* (Burger, 1980), designed for sixth grade students, combines independent study of urban areas with activities to develop students' higher level thinking skills.

A fifth grade class studied economic interdependence as it applied to their community (Braden, 1981). Students chose to study four aspects of their community's economic structure: household economics, the business world, financial institutions, and government. Learning activities included surveying class and community characteristics, analyzing the town's economic sectors, and locating the town's goods and services, studying retail businesses, analyzing income, and comparing agriculture, services, and industry, analyzing the school's organization, examining various types of taxes, and researching the town's budget.

*A Guide to Urban Wildlife Management* (Leedy and Adams, 1984) seeks to provide interested citizens with guidance and ideas on how to plan and manage for urban and suburban wildlife. In addition, it suggests how to enhance recreational, aesthetic, educational, and economic benefits associated with diversified habitats and sound fish and wildlife management. Discussed are values and public attitudes toward urban wildlife, wildlife habitats and environments, urbanization effects, responses of wildlife to urbanization, and principles and approaches to wildlife management.

*Urban Areas, Habitat Pac* (Fish and Wildlife Service, 1984f) discusses the city as an ecosystem, changing urban habitats, urban wildlife habitats, values of wildlife, habitat management, and encouraging wildlife in urban areas.

Urban Pest Management is the theme of a three-volume set of guides developed for the John Muir Institute for Environmental Studies (Cowles, 1983a, 1983b, 1983c). Integrated Pest Management, a decision-making approach to pest control, is designed to help people decide if pest suppression treatments are necessary, where they should be applied, when they should be initiated, and what strategy and mix of tactics to use. These materials are designed for use with K-6 students in studies of house mice, cockroaches, and head lice.

**Focus: Decision-Making, Individual and Institutional**

A set of ten activities (Yambert, 1985) for use by teachers to enhance environmental knowledge and environmentally responsible behavior focus on renewable and non-renewable resources, recycling, population growth, wildlife, and food, with an emphasis on how environmental knowledge is essential to responsible decision-making. An earlier publication by the same author (Yambert, 1984) presents the text for an environmental education learning sequence designed to enhance environmental knowledge and environmental ethics by providing information about energy, pollution, interrelationships, impacts, cycles, and quality of life. The sequence, suitable for students in grades 5 through 8, is based on accepted principles of developmental psychology in both the cognitive and affective domains.

The management of the Chesapeake Bay, a threatened and complex system, has provided an opportunity to develop a multi-disciplinary, self-contained curriculum unit for gifted and talented middle school students, or older students (University of Maryland, 1980). Major unit goals include identifying and analyzing conflicting interests, issues, and public policies concerning the Bay, and determining their effects on people and the environment.

*Law of the Sea, Resource Use, and International Understanding* (Earney, 1983) examines the mandates of the Law of the Sea Convention, which set aside approximately two-thirds of the world's oceans as a "common heritage of mankind." The paper illustrates, through brief examination of the Convention's precepts, significant questions which might confront students in educational settings: Can we afford a less than holistic approach in resource use planning? How are we to meet growing demands by Third World nations for an improved standard of living? How can we better understand and cope with differing political-economic views on the right of access to and equity in the benefits of global resources?

Activities to supplement secondary school global or future studies courses in the 10-state Mountain West region are presented in a teacher handbook by Smith and Bienstock (1983). The guide's three sections stress international interconnectedness, development of students' thinking and problem-solving skills, and student-oriented materials (handouts, etc.) which support the two themes.

Since this is an age of international interdependence and even those growing up in small rural communities are not insulated against spillover effects of global events, rural students should be exposed to world affairs and prepared for citizenship in the global community (Peters, 1984a, 1984b). These guides detail a Proactive Action Model (perception-thought pattern-action) which can be used to involve students directly in simulated activities which expose them to and involve them in critical thinking and decision-making. Emphasis is given to

the idea that a nuclear age curriculum should include in-depth investigation of divergent views and allow students to form their own opinions.

A sixth grade social studies curriculum (Rialto Unified School District, 1983) provides a context for a comparative study of individuals and societies. Included within the curriculum are interwoven themes of geography, culture, government, and economics.

A handbook (Hursh and Prevedel, 1983) useful in integrating a "state of the world atlas" into grades 7-12 curricula focuses on area studies, issues, and research skills.

Parallel ten-day teaching units (in English, science, and social studies) for secondary students dealing with nuclear issues have been produced by Jobs with Peace (French, et al., 1983a, 1983b, 1983c). Modes of instruction employed include discussion, role playing, brainstorming, and problem solving, for the purpose of developing students' abilities to evaluate issues and information in order to make educated decisions, with a strong emphasis on quality of life considerations.

The dilemmas and choices confronting Americans concerned with their environment are considered by a teaching guide (Melville, 1984) produced by the Public Agenda Foundation for use in secondary school social science classes. Its five sections are entitled, "The Gross National By-Product," "Acceptable Risks, Unacceptable Hazards," "Assigning Responsibility for a Legacy of Neglect." "Deciding What to do about the Wastes We Produce Today," and "Defining an Environmental Ethic."

The teacher and student editions for six modules designed to teach students how to investigate science-related social issues (Hungerford, et al., 1985) focus on environmental problem-solving, preparing to investigate an environmental issue, using surveys, questionnaires, and opinionnaires in environmental investigations, interpreting data in environmental investigations, investigating an environmental issue, and environmental action strategies. Also included are information on teaching for environmental literacy; a discussion of eight variables crucial to environmental literacy; assumptions on prerequisite knowledge; comments on instruction, skills, and knowledge; notes on values and value clarification; and brief comments on results obtained from several studies on the use of the modules.

*Science in a Social Context* (Solomon 1983a, 1983b, 1983c, 1983d) is a series of texts for a British sixth-form general studies course dealing with interrelationships between science and society. The course was designed to make scientific problems accessible to the non-scientist, as well as to explain the social aspects of science to the scientists. Among the titles of series volumes are *Evolution and the Human Population, How Can We Be Sure?, Technology, Invention, and Industry,* and *Ways of Living.*

*Innovations: The Social Consequences of Science and Technology, Final Report* (Tolman, 1981) indicates that units in the series were enthusiastically received by students and teachers and that, as a result of formative evaluation data collected, information was provided for revising the experimental materials to produce a better product. The units were designed for use in the 11th and 12th grades and at the junior college level, or as the basis of an interdisciplinary course of science, society, and technology.

A syllabus outlining a course of study in integrated regional resources management based on the agency's 50-year experience has been prepared by the Tennessee Valley Authority (1984). The course has been developed for resource managers in developing countries who have responsibilities related to topics addressed in the course's 14 instructional modules. Each module, ranging in length from two to five days, contains a combination of lectures, readings, case histories, field observation, and case study activities combined with group exercises in which participants plan and evaluate integrated regional resource development projects and programs.

*Preparing for Tomorrow's World* (Iozzi, et al., 1982) is an interdisciplinary, future-oriented secondary school science-social studies program incorporating information from the natural and social sciences and addressing societal concerns which interface science/technology/society. The objective of the program is to promote responsible citizenry with increased abilities in critical thinking, problem-solving, social/ethical reasoning, and decision-making. A socio-scientific reasoning model is the theoretical basis of the program. The model consists of four interacting components: logical reasoning development based on Piagetian theory, moral/ethical reasoning based on Kohlberg's stages, Selman's views of social role-taking stages, and a content (informational) component. The socio-scientific reasoning model serves as the basis for identifying types of learning experience and the sophistication level of those experiences necessary to help students develop. A major instructional strategy is the dilemma discussion, wherein brief stories in which dilemmas (conflicting moral/ethical issues) must be resolved. Six stages are involved: background information, presentation of dilemma, selection of alternative positions, small group discussions, class discussion, and discussion summary/closing. Both student guides and teacher guides are provided, in areas including: animals, nature, and people; bioethics; coastal decisions; communication; dilemmas; energy; people and environmental change; space encounters; technology and life styles; technology and society; transportation; urban land use.

The *Preparing for Tomorrow's World* guides may be located in ERIC microfiche collections as documents ED 230 367-230 388.

**Focus: ERIC/SMEAC Instructional Materials**

Over the past 13 years, the ERIC Clearinghouse for Science, Mathematics, and Environmental Education has published a series of teaching activity booklets in both general and specific areas of environmental education. Generally, teaching about environmental quality is a major objective of these guides. Among them are:

ED 091 172 – Wheatley and Coon, *One Hundred Teaching Activities in Environmental Education,* 1973;

ED 102 031 – Wheatley and Coon, *Teaching Activities in Environmental Education, Volume II,* 1974;

ED 125 868 – Wheatley and Coon, *Teaching Activities in Environmental Education, Volume III,* 1975;

ED 130 833 – Coon and Alexander, *Energy Activities for the Classroom,* 1976;

ED 137 140 – Coon and Bowman, *Environmental Education in the Urban Setting,* 1977;

ED 141 178 – Schultz and Coor, *Population Education Activities for the Classroom,* 1977;

ED 144 826 – McCabe, et al., *Man and Environment Teaching Activities,* 1977;

ED 150 026 – Coon and Price, *Water-Related Teaching Activities,* 1977;

ED 152 541 – Bowman and Disinger, *Land Use Management Activities for the Classroom,* 1977;

ED 159 075 – Bowman and Coon, *Recycling: Activities for the Classroom,* 1978;

ED 162 897 – Hernbrode, *Multidisciplinary Wildlife Teaching Activities,* 1978;

ED 173 072 – Coon and Bowman, *Energy Activities for the Classroom, Volume II,* 1978;

ED 182 118 – Bowman, *Values Activities in Environmental Education,* 1979;

ED 183 374 – McCormack, *Outdoor Areas as Learning Laboratories,* 1979;

ED 194 349 – Roth and Lockwood, *Strategies and Activities for Using*

*Local Communities as Environmental Education Sites*, 1979;

ED 196 704 – Bowman, *Teaching Basic Skills through Environmental Education Activities*, 1979;

ED 214 758 – Bowman, *Teaching Natural Resources Management through Environmental Education Activities*, 1981;

ED 229 214 – Mann and Stapp, *Thinking Globally and Acting Locally: Environmental Education Teaching Activities*, 1982;

Another volume in the series, *Teaching about Hazardous and Toxic Materials*, by Disinger and Lisowski, is now in preparation.


**Summary**

This *Information Bulletin* contains a number of recent entries into the ERIC system which provide material (mostly teaching suggestions) for teachers interested in presenting instruction dealing with improvement of environmental quality. A number of additional materials, some of which may be more useful in particular situations, also may be located by searching the ERIC system; more materials are added every month. An earlier ERIC/SMEAC publication (Disinger and Howe, 1982) presented a selection of instructional materials for environmental education entered into the ERIC system through 1982.

There is little likelihood that the diligent searcher of the ERIC system will have difficulty finding materials of use in improving instruction related to environmental quality. Similarly, he/she may not find ready-to-use materials, in the "teacher-proof" sense. It is more likely that materials needing adaptation to local circumstances can be found, then modified as needed.


## References


Adams, Lowell W., and Louise E. Dove. *Urban Wetlands for Stormwater Control and Wildlife Management*. Columbia, MD: National Institute for Urban Wildlife, 1984. ED 249 041.

Alberta Environment, Environmental Education Resources Branch. *Water Quality Monitoring: An Environmental Studies Unit for Biology 20/30, Student Manual*. Edmonton, Alberta: Alberta Environment, 1984a. ED 250 184.

Alberta Environment, Environmental Education Resources Branch. *Water Quality Monitoring: An Environmental Studies Unit for Biology 20/30, Teacher's Guide*. Edmonton, Alberta: Alberta Environment, 1984b. ED 240 183.

Backler, Alan. *Energy and Economics for the Elementary Grades, Unit I*. Indianapolis, IN: Indiana State Department of Public Instruction, 1984a. ED 250 187.

Backler, Alan. *Energy and Economics for the Middle Grades, Unit II*. Indianapolis, IN: Indiana State Department of Public Instruction, 1984b. ED 245 889.

Backler, Alan. *Energy and Economics for the Senior High Grades, Unit III*. Indianapolis, IN: Indiana State Department of Public Instruction, 1984c. ED 250 188.

Ballou, Mildred, and Martha Lane. *Energy and Transportation Lessons for the Elementary Grades*. Indianapolis, IN: Indiana State Department of Public Instruction, 1984. ED 250 189.

Barney, Gerald O., Study Director. *Entering the Twenty-First Century: The Global 2000 Report to the President, Volume I*. Washington, DC: U.S. Government Printing Office, Superintendent of Documents, S/N 041-011-00037-8. ERIC ED 188 935.

Barrow, Lloyd H. *Teacher's Resource Guide on Acidic Precipitation with Laboratory Activities*. Orono, ME: University of Maine, 1983. ED 234 990.

Baxter, Zeland L., et al. *The Recovery of Energy from Waste*. Nashville, TN: Tennessee State University, 1981. ED 258 817.

Berg, Cathy A. *Teacher's Guide: Educational Materials in Resource Recovery, Grades K-12, 2nd Edition*. Roseville, MN: Minnesota Pollution Control Agency, 1984. ED 258 835.

Braden, Nancy. *No City Is an Island: The Study of Interdependence*. Normal, IL: National Depository for Economic Education Awards, 1981. ED 238 757.

Bread for the World Educational Fund. *When I Was Hungry, A Hunger Course for High School Students, Student Packet*. Washington, DC: Bread for the World Educational Fund, 1980a. ED 253 440.

Bread for the World Educational Fund. *When I Was Hungry, A Hunger Course for High School Students, Teacher's Manual and Action Packet*. Washington, DC: Bread for the World Educational Fund, 1980b. ED 253 439.

Bureau of Reclamation, U.S. Department of the Interior. *Water Wise: A Water Reuse Handbook*. Washington, DC: Bureau of Reclamation, 1981. ED 237 310.

Burger, Celia R. *The City: A Multidisciplinary Unit Exercising the Higher Level Thinking Skills of Analysis, Synthesis, and Evaluation*. Cedar Falls, IA: Area Education Agency 7, 1980. ED 241 377.

Butzow, John W., et al. *What Are the ABC's of Marine Education? An Introduction to Marine Education in the Gulf of Maine Region*. Orono, ME: University of Maine, 1982. ED 238 726.

Carroll, Walter B., and Carolyn L. Carroll. *A Guide to Field Trip Sites in Coastal North Caroline, Project CAPE Teaching Module SC3a*. Manteo, NC: Dare County Board of Education, 1982. ED 243 722.

Carson, Rachel. *Silent Spring*. Boston: Houghton Mifflin, 1962.

Cowles, Kathleen Letcher. *The Case of the Wild House Mouse*. Napa, CA: John Muir Institute for Environmental Studies, 1983a. ED 238 699.

Cowles, Kathleen Letcher, et al., compilers. *Urban Pest Management: Selected Readings*. Napa, CA: John Muir Institute for Environmental Studies, 1983c. ED 238 698.

Dalton, William Edward. *City Planning Unit: Grade 6*. Normal, IL: National Depository for Economic Education Awards, 1980. ED 238 754.

Disinger, John F., and Robert W. Howe. *Especially for Teachers: Selected Documents on the Teaching of Environmental Education 1966-1982*. Columbus, OH: ERIC/SMEAC, 1983. ED 247 081.

Earney, Fillmore C. F. *Law of the Sea, Resource Use, and International Understanding*. A paper presented at the conference of the National Council for Geographic Education, 1983. ED 239 999.

East Michigan Environmental Action Council. *Groundwater Quality Protection in Oakland County: A Sourcebook for Teachers*. Troy, MI: East Michigan Environmental Action Council, 1984. ED 257 685.

Eckbreth, Catherine. *Block Study: Learning about Your Local Community*. Arlington, VA: Arlington County Public Schools, 19[illegible]. ED 239 959.

Entine, Lynn, and Ellen Fisher, Editors. *Our Great Lakes Connection: A Curriculum Guide for Grades K-8*. Madison, WI: University of Wisconsin, 1985. ED 253 418.

Fish and Wildlife Service, U.S. Department of the Interior. *Beaches, Dunes, and Barrier Islands, Habitat Pac*. Washington, DC: Fish and Wildlife Service, 1984a. ED 249 068.

Fish and Wildlife Service, U.S. Department of the Interior. *Endangered Species, Issues Pac*. Washington, DC: Fish and Wildlife Service, 1984b. ED 249 069.

Fish and Wildlife Service, U.S. Department of the Interior. *Freshwater Marsh, Habitat Pac*. Washington, DC: Fish and Wildlife Service, 1984c. ED 249 070.

Fish and Wildlife Service, U.S. Department of the Interior. *Hunting and Wildlife Management, Issue Pac*. Washington, DC: Fish and Wildlife Service, 1984d. ED 251 306.

Fish and Wildlife Service, U.S. Department of the Interior. *Migratory Birds, Issue Pac*. Washington, DC: Fish and Wildlife Service, 1984e. ED 249 071.

Fish and Wildlife Service, U.S. Department of the Interior. *Urban Areas, Habitat Pac*. Washington, DC: Fish and Wildlife Service, 1984f. ED 249 072.

Fish and Wildlife Service, U.S. Department of the Interior. *Wetlands Conservation and Use, Issue Pac*. Washington, DC: Fish and Wildlife Service, 1984g. ED 249 073.

Fish and Wildlife Service, U.S. Department of the Interior. *Wildlife Conflicts, Issue Pac*. Washington, DC: Fish and Wildlife Service, 1984h. ED 251 307.

French, Dan, et al. *Crossroads: Quality of Life in a Nuclear World, a High School English Curriculum*. Boston, MA: Jobs with Peace, 1983a. ED 240 044.

French, Dan, et al. *Crossroads: Quality of Life in a Nuclear World, a High School Social Studies Curriculum*. Boston, MA: Jobs with Peace, 1983b. ED 240 045.

French, Dan, et al. *Crossroads: Quality of Life in a Nuclear World, a High School Social Studies Curriculum*. Boston, MA: Jobs with Peace, 1983c. ED 240 046.

Goldman, Jill S., and others. *Investigations: Toxic Waste, a Science Curriculum in the Participation Series*. Cambridge, MA: Educators for Social Responsibility, 1984. ED 254 443.

Gray, Carmen P., and Diane W. Forrest. *A Sea Creature Treasury, Project CAPE Teaching Module K-2b*. Maneto, NC: Dare County Board of Education, 1982. ED 243 725.

Gray, R. Wayne, and William T. Martin. *Wanchese Harbor-Community Development, Project CAPE Teaching Module SOC*. Manteo, NC: Dare County Board of Education, 1982. ED 243 726.

Hampton, Carolyn H., and Toni Weston. *Marine Organisms in the Classroom, Project CAPE Teaching Module SC1*. Manteo, NC: Dare County Board of Education, 1982. ED 243 727.

Hungerford, Harold R., et al. *Investigations and Evaluating Environmental Issues and Actions: Skill Development Modules*. Champaign, IL: Stipes Publishing Company, 1985. ED 257 664.

Hursh, Heidi, and Michael Prevedel. *Activities Using "The State of the World Atlas," Grades 7-12*. Denver, CO: University of Denver, 1983. ED 240 004.

Iozzi, Louis A. *Curriculum Model, Teacher's Guide, Preparing for Tomorrow's World*. Longmont, CO: Sopris West, Inc., 1982. ED 230 368.

Jacobson, Cliff. *Water, Water Everywhere, But ...* Loveland, CO: Hach Company, 1983. ED 242 373.

Jeske, Walter E., editor. *Economics, Ethics, Ecology*. Ankey, IA: Soil Conservation Society of America, 1981. ED 212 500.

Kelly, Francene, and Laura Phelan. *Water World Creatures, Project CAPE Teaching Module K-2a*. Manteo, NC: Dare County Board of Education, 1982. ED 243 724.

Keown, Duane, et al. *A New Land Ethic for the 21st Century*. A paper presented at the National Association for Laboratory Schools Convention, 1984. ED 255 364.

Leedy, Daniel L., and Lowell W. Adams. *A Guide to Urban Wildlife Management*. Columbia, MD: National Institute for Urban Wildlife, 1984. ED 249 047.

Leopold, Aldo. *A Sand County Almanac and Sketches Here and There*. New York: Oxford, 1948.

Melville, Keith, editor. *Difficult Choices about Environmental Protection, 1984 National Issues Forum*. New York, NY: Public Agenda Foundation, 1984. ED 255 432.



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Minnesota State Department of Education. *Minnesota and Energy*. St. Paul, Minnesota Department of Education, 1982. ED 245 918.

Murphy, Elaine M. *Food and Population: A Global Concern, (and) The Paradoxes of World Hunger*. Washington, DC: Population Reference Bureau, 1984. ED 244 898.

National Wildlife Federation. *Acid Rain: What It Is, How You Can Help!* Washington, DC: National Wildlife Federation, 1983. ED 248 102.

New York City Board of Education. *Urban Studies: A Social Studies Option for High Schools, Curriculum No. 00-406040*. Brooklyn, NY: New York City Board of Education, 1982. ED 244 033.

Newton, David E., and Irwin L. Slesnick. *Hanging on to the Wetlands, Book I*. Bellingham, WA: Western Washington University, 1981a. ED 244 794.

Newton, David E., and Irwin L. Slesnick. *Hanging on to the Wetlands, Book II*. Bellingham, WA: Western Washington University, 1981b. ED 244 795.

Newton, David E., and Irwin L. Slesnick. *Hanging on to the Wetlands, Book III*. Bellingham, WA: Western Washington University, 1981c. ED 244 796.

Noy, Laura. *Protect Minnesota's Agricultural Land: Components and Activities for Elementary Students*. St. Paul, MN: Governor's Council on Rural Development, 1984. ED 251 258.

Parker, Francis, and Devon Yoho. *Energy and Transportation Lessons for the Middle Grades*. Indianapolis, IN: State Department of Public Instruction, 1984a. ED 250 190.

Parker, Francis, and Devon Yoho. *Energy and Transportation Lessons for the Senior High Grades*. Indianapolis, IN: State Department of Public Instruction, 1984b. ED 250 191.

Peters, Richard. *Developing Global Perspectives about International Relations among Proactive Action Students in Rural Schools*. Plaistow, NH: Global Horizons, The Center for Applied Ecosocial Studies, 1984a. ED 243 622.

Peters, Richard. *Developing Global Perspectives about Nuclear Arms Control among Proactive Action Students in Rural Schools: A Teacher's Guide*. Plaistow, NH: Global Horizons, The Center for Applied Ecosocial Studies, 1984b. ED 243 623.

Peters, Richard. *How to Teach about Human Population in the Global Community: From Bucharest to Mexico City, Teacher Resource Guide*. Plaistow, NH: Global Horizons, The Center for Applied Ecosocial Studies, 1985. ED 251 397.

Platania, Phil, and Debbie Haught. *Early Maritime Cultures of North Carolina, Project CAPE Teaching Module 5-8c*. Manteo, NC: Dare County Board of Education, 1983. ED 243 723.

Rialto Unified School District. *Our World, Its Diverse Peoples; Sixth Grade Social Studies Course Outline*. Rialto, CA: Rialto Unified School District, 1983. ED 245 964.

Smith, Gary R., and Eric M. Bienstock. *The Mountain West and the World: International Connections and Alternative Futures*. Ogden, UT: Weber State College, 1983. ED 238 768.

Solomon, Joan. *Evolution and the Human Population, Science in a Social Context*. Cambridge, England: Association for Science Education, 1983a. ED 248 108.

Solomon, Joan. *How Can We Be Sure? Science in a Social Context*. Cambridge, England: Association for Science Education, 1983b. ED 248 104.

Solomon, Joan. *Technology, Invention, and Industry, Science in a Social Context*. Cambridge, England: Association for Science Education, 1983c. ED 248 105.

Solomon, Joan. *Ways of Living, Science in a Social Context*. Cambridge, England: Association for Science Education, 1983d. ED 248 107.

Solomon, Gerard. *Wet Worlds: Explore the World of Water*. Staten Island, NY: Staten Island Continuum of Education, 1983. ED 239 839.

Stone, Sally F. *Illinois Natural Heritage Conservation/Education Kit IV, Special Theme: Wetland Ecology and Management*. Springfield, IL: Illinois State Department of Education, 1984. ED 247 122.

Tennessee Valley Authority. *Integrated Regional Resources Management, A Syllabus for an International Training Course Based on the Experience of the Tennessee Valley Authority*. Knoxville, TN: TVA, 1984.

Tierney, Blue, Compiler. *Energy Activities for the Primary Classroom, Revised*. Placerville, CA: El Dorado County Office of Education, 1984. ED 249 082.

Tolman, Richard R. *Innovations: The Social Consequences of Science and Technology, Final Evaluation Report*. Boulder, CO: Biological Sciences Curriculum Study, 1981. ED 239 846.

Udall, Stewart L. *The Quiet Crisis*. New York, NY: Holt, Rinehart, and Winston, 1963.

UNESCO. *Population Education in Health and Home Economics: Some Sample Lessons for the Secondary Level*. Bangkok, Thailand: Unesco Regional Office for Education in Asia and the Pacific, 1984a. ED 252 444.

UNESCO. *Population Education in Mathematics: Some Sample Lessons for the Secondary Level*. Bangkok, Thailand: Unesco Regional Office for Education in Asia and the Pacific, 1984b. ED 252 443.

UNESCO. *Population Education in Science: Some Sample Lessons for the Secondary Level*. Bangkok, Thailand: Unesco Regional Office for Education in Asia and the Pacific, 1984c. ED 252 442.

UNESCO. *Population Education in Social Studies: Some Sample Lessons for the Secondary Level*. Bangkok, Thailand: Unesco Regional Office for Education in Asia and the Pacific, 1984d. ED 252 441.

University of Maryland, Science Teaching Center. *Decision Making/The Chesapeake Bay, and Interdisciplinary Environmental Education Curriculum Unit*. College Park, MD: University of Maryland, 1980. ED 255 381.

Uno, Gordon E., et al. *Investigating the Human Environment: Land Use*. Boulder, CO: Biological Sciences Curriculum Study, 1984. ED 249 079.

Wagner, David L., and Douglas Fraleigh. *ERIC First Analysis: Water Resources, 1985-86 National High School Debate Resolutions*. Urbana, IL: ERIC Clearinghouse on Reading and Communication Skills, 1985. ED 257 158.

Waldorp, Ann S. *Economic Simulation Game: A Two Day Simulation for Grades 9-12*. Normal, IL: National Depository for Economic Education Awards, 1981. ED 238 759.

Wood, David, and Jeanette Bryant. *Acid Rain, Activities for Grades 4 to 12, a Teacher's Guide*. Washington, DC: National Wildlife Federation, 1983. ED 241 259.

Yambert, Paul, et al. *Connections in Our World: Focus on Environmental Education*. Carbondale, IL: Department of Educational Paychology, 1984 ED 253 414.

Yambert, Paul, et al. *Environmental Education Activities to Enhance Decision-Making*. 1985. ERIC ED 253 437.

Zenke, Pam. *Clean, Safe Water. For How Long?* Springfield, IL: Illinois Environmental Protection Agency, 1980. ED 237 311.

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